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# A Review of the New Energy Policy and the Challenges Faced in the Promotion of Renewable Energy and Cogeneration in Malaysia.

by

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# New Energy Policy

Predicated on the following aspects:

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- a) Need to enhance energy security by using energy efficiently :-
  - Volatile oil and gas markets
  - Competitive use of gas
  - Depleting fossil fuel reserve
  - Pressure to increase efficiency: 35% in open cycle, 50% in combined cycle mode but 80% in cogeneration
- b) Need for sustainable development and minimize environmental degradation.
  - Promotion of Renewable Energy

# Definition of Cogeneration

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*“Simultaneous production of two or more forms of usable energy from a single energy source”*

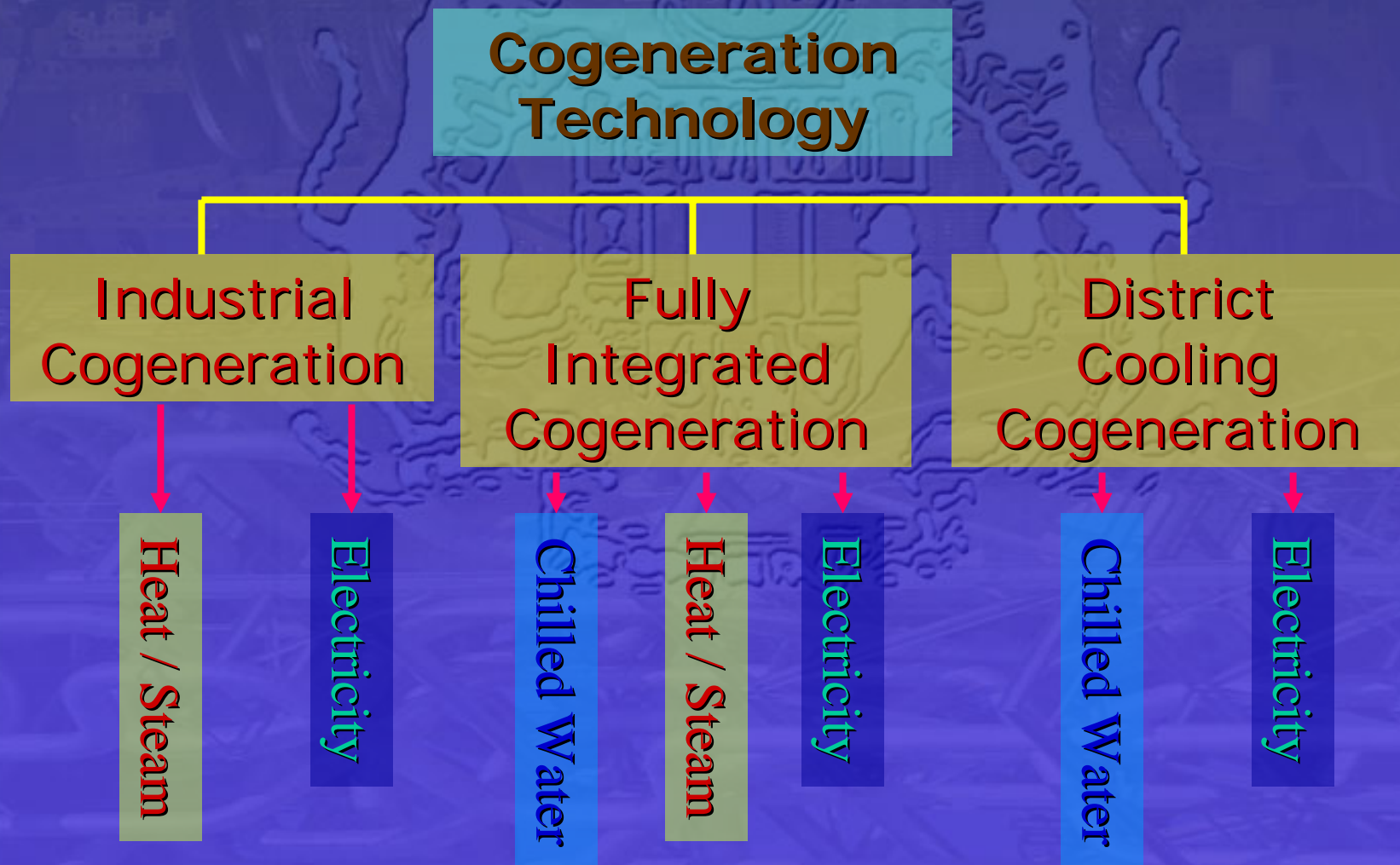
# Cogeneration cycles

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- Topping Cycle
  - Fuel used to produce electrical energy first, then thermal energy
- Bottoming Cycle
  - Fuel used to produce thermal energy first, then electrical energy

# Types of Cogeneration Plants



A vertical strip on the left side of the slide shows a lightning bolt striking a power line tower. The background of the slide is a dark blue gradient with a faint, embossed map of the United States.

# The Ideal Cogeneration Site:

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- Requires reliable power
- Has a relatively steady electrical and thermal energy demand pattern
- Has a higher demand for thermal energy compared to electrical energy
- Has long operation hours in the year
- Inaccessible to the grid

# Cogeneration in Malaysia

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- Has existed in Malaysia for a long time, but more can be done
- District cooling most common due to tropical climate
- Licensing under purview of Ministry of Energy, Water & Communication
- 34 licenses issued - 13 public, 21 private ( year 2003 )

# Typical Use of Cogeneration in Malaysia

| Type                                 | Area  | Examples   |
|--------------------------------------|---|--|
| <b>Industrial Cogeneration</b>       | Pulp & paper, Cement, Steel, Glass, etc                             | Perwaja Steel, Shell Refining, Titan Petrochemical |
| <b>Fully Integrated Cogeneration</b> | Large industrial complexes requiring heating, cooling & electricity | Petronas CUF, Proton City                          |
| <b>District Cooling Cogeneration</b> | Large commercial complex or high rise office buildings              | KLIA, KLCC, KL Sentral, Tractors Malaysia          |

# Policy Framework

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- Government in support of highly efficient energy systems, especially those using Renewable Energy sources
- Need to balance growth of Cogeneration and National Grid
- Strike a balance so that *existence of one doesn't jeopardise the other*

A vertical image on the left side of the slide shows a bright white lightning bolt striking a power line tower. The tower is made of metal lattice and has several power lines extending from it. The background of the slide is a dark blue color with a faint, embossed map of the United States.

# Policy Framework - Envisioned Cogeneration Policy

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- Policy needs fine-tuning from time to time
- Need to maintain a reliable, stable & viable grid and electricity supply system for the masses
- To avoid 'back-door IPP'

# Policy Framework - Envisioned Cogeneration Policy

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- Important elements to consider
  - Effect on existing system
  - Impact of distributed generation
  - Sizing and location of plant
  - Type of plant
  - Fuel type
  - Gas price
  - Sale of excess electricity to the grid
- Need to specify minimum overall energy efficiency and maximum or minimum heat to power ratio of plant

A vertical image on the left side of the slide shows a lightning bolt striking a power line tower. The lightning bolt is bright white and yellow, with multiple branches. The tower is a lattice structure, and the background is dark with some blue and green highlights.

# Envisioned Cogeneration Policy

## - *Effect on existing system*

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- If cogen plant not connected to grid
  - Indirect effect. Grid capacity planned for that area not taken up, thus increasing reserve margin
  - Cogen capacity planning must be done together with grid capacity planning
- If cogen plant connected to grid
  - As above, plus unreliable capacity from cogenerators since smaller machines generally more susceptible to unplanned outages
  - Only excess power can be exported. Grid operator cannot be certain of the capacity available from cogenerators

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# Envisioned Cogeneration Policy

## *- Impact of Distributed Generation*

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- Power quality must be controlled by cogenerators themselves
- Too many generators can hamper power quality improvement efforts, e.g. frequency fluctuation
- Localised exhaust emission - fuel burnt in vicinity.
- Large dedicated power stations are away from populated areas and can install Electrostatic Precipitators (ESP) and Flue Gas Desulphurisers (FGD)

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# Envisioned Cogeneration Policy

## - *Sizing of plant*

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- Largest licensed is 210MW, but capacity for future development may be capped, e.g. <50MW
- Topping Cycle plant - capacity matched to electrical load/ demand
- Bottoming Cycle - capacity matched to thermal load

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# Envisioned Cogeneration Policy

## - *Location of Cogen Plant*

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- In newly developed or remote areas away from the grid and cost of building infrastructure to connect is exorbitant
- Being remote, more space for exhaust emission to dissipate and settle away from population
- E.g. Palm oil mills, timber processing, municipal waste disposal facilities


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# Envisioned Cogeneration Policy

## - *Plant type*

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- All types of topping or bottoming cycle Industrial, District Cooling and Fully Integrated Cogeneration plant allowed
- Selection of type and capacity of plant must be justified

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# Envisioned Cogeneration Policy

## - *Fuel type*

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- Renewable Energy favoured to promote RE as Fifth Fuel
- Reduce dependence on fossil fuels
- Fossil fuels should only be considered based on merit of the project and should be minimised

# Envisioned Cogeneration Policy

## - *Gas Price*

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- Gas is largest contributor to Malaysia's Generation fuel mix
- RM6.40/mmBTU only for power sector, not for Industry/ cogenerator
- For Industry/ Cogenerator, Government has revised tariff effective 1 October 2002 until 31 December 2005
- Monthly fee & infrastructure capital contribution scrapped
- New price not pegged to Medium Fuel Oil (MFO) - no fluctuation

# Envisioned Cogeneration Policy

## - Gas Price (wef 1/10/2002)

| Category               | Consumption range (mmBTU/yr) |                | Rate (RM/mmBTU) |       | % Reduction |
|------------------------|------------------------------|----------------|-----------------|-------|-------------|
|                        | Old                          | New            | Old             | New   |             |
| Tariff A (Domestic)    | -                            | -              | 21.04           | 19.72 | 6.25        |
| Tariff B (Commercial)  | -                            | Up to 600      | 19.72           | 15.25 | 22.67       |
| Tariff C (Comm. & Ind) | 601-5000                     | 601-5000       | 17.10           | 13.41 | 21.54       |
| Tariff D (Comm. & Ind) | 5001-50,000                  | 5001-50,000    | 13.15           | 13.15 | 0           |
| Tariff E (Industrial)  | 50,001-200,000               | 50,001-750,000 | 29.06           | 12.87 | 55.45       |
| Tariff F (Industrial)  | 200,001-750,000              | 50,001-750,000 | 23.05           | 12.87 | 43.67       |

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# Envisioned Cogeneration Policy

## *- Sale of excess power to grid*

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- Selling of excess power to grid is not allowed to avoid jeopardising existing electricity supply system
- Cogenerator developers shouldn't oversize their capacity and end up with redundant energy

# Renewable Energy In Malaysia

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- RE sources are those that are continuously available in our environment and can be replenished in short time - solar, hydro, biomass, wind etc
- Government committed to developing RE as additional source of fuel under 8<sup>th</sup> M'sia Plan
- Promote and encourage use of RE where commercially viable and environmentally sustainable

# RE as 5<sup>th</sup> Fuel

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- RE as the fifth fuel after gas, oil, coal and hydro
- Current policy spelt out in Malaysia's 3<sup>RD</sup> OPP (2001-2010) ... *manage both depletable and renewable resources...to ensure adequate, secure, quality and cost effective supply...promote its utilization and minimize negative impact on environment*
- In medium term, target 5% share of RE for grid - connected electricity generation.

# Strategies for RE Development

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- Promotion of RE resources such as biomass, municipal waste, solar and mini hydro - SREP
- In-house biomass based cogeneration
- Demonstration projects
- R&D especially in the use of alternative sources such as palm diesel, solar, photovoltaic, hydrogen & fuel cell
- Commercialisation of research
- Assistance from foreign entities - UNDP, NEDO
- Looking at viable application for international cooperation such as CDM

# RE Policy Infrastructure Set

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- Target - 5% RE contribution to grid system by 2005
- Grid connection for RE projects
- Investment incentives for RE projects
- Pricing - grid access projects must negotiate pricing with TNB or SESB
- Education, awareness & training - stakeholders such as financial sector, State Govt, IPPS, palm oil millers etc

# Current Status of RE

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- SREP Program - 59 projects approved, REPPA signed, 6 licensed. Bulk of projects mainly biomass and mini hydro
- Current UNDP-GEF Biogen Program still slow
- BIPV - approval for 5 year UNDP-GEF project

# Challenges Faced in the Promotion of Renewable Energy and Cogeneration in Malaysia

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## a) Cogeneration

- Gas price – RM6.40 / MMBTU only for the electricity sector
- Connection to the grid – Implication on the reserve margin for the utilities

# Challenges Faced in the Promotion of Renewable Energy and Cogeneration in Malaysia

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## b) Renewable Energy

- Direct government intervention necessary to drive RE.
- Greater corporate responsibility towards sustainable development
- Emerging competitive uses of raw material
- Access to capital market for small scale RE projects - financial sector response still slow and weighed down by uncertainty & risk
- Tariff of 17 sen/kwH and financial return seen as unattractive

# Challenges Faced in the Promotion of Renewable Energy and Cogeneration in Malaysia

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## b) Renewable Energy (Cont'd)

- Many new and promising technologies for meeting sustainable development goals require high costs and investments. Use CDM to facilitate investment and transfer of technology.
- Lack of viable demonstration projects
- Awareness and capacity building among stakeholders still low
- Commercialisation and economies of scale still far away

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# Conclusion

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- Government is in full support of cogeneration, especially RE-based
- Promoting cogeneration should not jeopardise or destabilise the existing electricity supply system
- RE based cogeneration projects could qualify and enjoy the benefits of SREP if they fulfil the criteria
- Future policy will emphasise RE based cogeneration plants and systems that would greatly enhance efficiency



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**THANK YOU**